

with practice, about half an hour later one of the young accentors was ejected: strange to say, its mother was present, and looked on quite calmly, but the desperate efforts of the young murderer seemed for the time to exhaust it, so that it was not until 1 p.m. that it returned to the work and pushed out the second egg, and then tried to put out the remaining accentor. This at 3.30 was done, and the cuckoo remained sole occupant. No wonder Mr. Hancock writes:—"The cuckoo's proceeding, as I saw it, is, in my opinion, the most wonderful and unaccountable piece of business that I ever witnessed in bird life." Some of our readers may like to learn that one of the unfortunate young accentors was placed in a whitethroat's nest, where there were four young ones about its own age, and that it was properly attended to by its foster-parents, whereas the young cuckoo was, after a week's short existence, found dead, apparently of sunstroke, at the bottom of its nest.

THE TORTURE OF THE FISH-HAWK.—While the facts above recorded about the cuckoo are wonderful, and, from a human standpoint, perhaps cruel, they would seem to be surpassed in both respects by those recently recorded about the fish-hawk of Southern Florida by a well-known observer, J. Lancaster (*American Naturalist*, March 1886). The distribution of land and water on the Gulf coast of Florida is very favourable to the existence of fish, and the flats and creeks swarm with life. Birds subsisting on fish diet also abound. Long lines of pelicans can be seen on every hand; armies of cranes stalk about; fish-hawks abound. These latter are arboreal in their habits, nesting in the tops of the pine-trees, and rarely resting on the ground. For the most part they fish in the secluded creeks and inlets, hovering over the water and capturing their prey by suddenly diving upon it; but sometimes they fish in the open waters. While large, active-winged birds, they never soar. On first acquaintance their actions seemed inexplicable: while in the hidden creeks they uttered no cry and seemed to be masters of the gentle art; but in the open, allured thereto by a school of mullet, at the moment when they would seem eager for action and all alive with expectation, just as they might be swooping on a fish, they would emit a discordant, frightened scream, and make for the shore with a haste so ill-advised as to seriously impede their progress. The shelter of the trees gained, the terror would subside. Desire for food would tempt the bird once more out, and again and again the same frantic performance was to be witnessed. The reason was soon made evident. A fine specimen of the fish-hawk swooped on a fish, which soon left its element and swung aloft in the bird's talons. The hawk began its homeward journey. But now a new-comer appeared on the scene. A black creature, which seemed all wings, dropped from above and confronted the hawk, which at once let go its prey and uttered a scream so brimful of mortal terror as to excite one's pity. The hawk was not struck, and it made off with wild haste for shore. The intruder was a frigate-bird, which seized the dropped fish in its beak long ere the prey reached the water, and then with a sweep of exquisite grace, on tense wings, fronting a mild breeze, the corsair was lifted half a mile into the air. A bite was taken from the fish by a wringing motion of the bird's head, which sent the carcass whirling. The morsel being swallowed, the bird, folding its wings tightly on its body, dropped swiftly after the fish, seized it, again swept upwards, and then the performance was repeated till the meal was over. In a personal contest for superiority on the ground of physical strength the frigate-bird, with its small legs and feet and its head and beak not stronger than the fish-hawk's, was no match for the latter; but sometimes the fish-hawk does not play its part as capturer of the prey desired by the frigate-bird, and several of these latter combine to cut off its retreat landwards, swoop about it until the unfortunate victim loses its power of screaming, then of flight; down it falls at last exhausted into the waters of the Gulf; the demon birds still pursue it; with their miserable, puny feet they alight on it, and push it beneath the surface, continuing in one case to do this for over an hour, until the bird was dead. When the hawks captured fish they were not so treated—they were robbed, not killed. It would seem as if the existence of the fish-hawk as a species depended on their understanding this, and that now and then those that did not understand lost their lives in the struggle.

THE SENSIBILITY AND MOVEMENTS OF PLANTS.—To the last number of the *Bulletin de l'Académie Royale de Belgique*, the late Prof. Morren contributes a valuable memoir on the sensibility and movements of plants, in which he further develops

Darwin's well-known theory, and attempts to establish a complete synthesis of the animal and vegetable kingdoms. It is argued that the law of sensation producing motion dominates all the biological sciences, that plants are sensible to the influences of the environment, and not only move, but are able to co-ordinate their movements. All the phenomena of motion are referred in ultimate analysis to protoplasm, a living substance common alike to plants and animals, and whose general and essential characteristics are precisely the power of sensation and movement. It has the faculty of receiving external agencies, and of moving *proprio motu*. It stirs, therefore it lives! And this is equally true of all organisms from man to the microbe and the plant. Life might be defined as the activity of protoplasm, although this is a substance whose true nature is still unknown, of whose texture we are ignorant, and whose activity is a property, the mechanism of which has not yet been discovered.

HEREDITY.—The same *Bulletin* contains an equally interesting paper by M. Ch. Van Bambeke, on heredity, in which the theories of Darwin, Haeckel, Nägeli, Pflüger, and others are subjected to a searching criticism. Both pangenesis and plastidulperigenesis are rejected, as inadequate to explain all the phenomena of heredity, which, it is argued, can be accounted for only by supposing that the germ, Weismann's *Keimplasma*, is in fact continuous. It is not to be regarded as the final outcome of the ontogenesis of each individual, but passes from parent to offspring directly, being from the first present in an unmodified form in a large number, possibly in all the somatic cells. The germinative plasma persists through certain cellular series, concentrating itself anew in the embryonic cells of the new organism. In a word, in the phylogenetic development of the organisms the germ, whose true seat has now been determined, is perpetuated throughout the whole series of successive ontogenies. The generations succeed and efface each other; the *Keimplasma* alone is immortal.

GEOGRAPHICAL NOTES

THE progress of drying up of the steppes around the Caspian Sea is steadily going on. Thus we learn from a recent communication by M. Krasnoff to the Geographical Society that the series of the Sarpinsk lakes in the eastern part of the Kalmuck steppes, close to the Ergheni hills, are rapidly disappearing; the lakes Chilguir and Keke-tzun have quite disappeared in the course of the last year.

GENERAL TILLO publishes in the last issue of the *Izvestia* of the Russian Geographical Society the results of new exact levellings made in order to ascertain the heights above the sea of Lakes Ladoga, Onega, and Ilmen. Their respective heights above the average level of the Gulf of Finland appear to be only 16, 115, and 59 feet, with a probable error not exceeding 1.5 feet. The formerly accepted heights were 59, 237, and 157 feet.

A VERY interesting paper on the irrigation of the oases of Merv and Akhal-Tekke was recently read by M. Pokrovskiko-kozel at St. Petersburg, before the Society for the Assistance of Russian Trade and Commerce, Count Ignatieff being in the chair. The lecturer considers the Merv oasis as one of the most fertile spots on the earth. Wheat, rice, and other cereals cultivated by natives for home consumption yield beautiful crops. The oasis includes about 900,000 acres of cultivable land. But, in order to cultivate them, it would be necessary to colonise the oasis with civilised pioneers, and to spend about 120,000*l.* on the restoration and extension of the splendid system of canals built up by the Arabs a thousand years ago, and preserved until now in some parts, as, for instance, at the mouth of the River Murhab, about 50 miles from Merv. These canals are 14 feet deep and 70 feet wide, and partly used even now by the Merv Turcomans for the irrigation of their fields, though in a primitive manner. The Akhal-Tekke oasis is not so rich as that of Merv, but still it has about 900,000 acres of land suitable for culture. It covers the space of 7 miles along the railway line from Mikhailovsk Bay to Khizil Arvat, and could be irrigated by the water from the River Tejen.

THE Imperial Russian Geographical Society has decided in its Natural Science Section, to organise during the current year another expedition to Central Asia, in order to investigate the mountain district of Khan-Tengri, which has never yet been explored by any of the European travellers in Central Asia.

PROF. GUIDO CORA has lately printed the address he delivered in November 1883 at the opening of the annual course of geographical studies in the University of Turin. This address, dealing with the surface of the earth as the proper subject of geography, has a special interest for the English public, who are just now occupied with the question of geographical reform. The author accordingly appeals more particularly to those English men of science "who seem still to entertain grave doubts whether geography really possesses a scientific and individual character, and whether it is entitled to be taught even in Universities." Amongst the subjects discussed are, the relations of geography to the other sciences, geography an individual science, separation of geology from geography, division of geography in reference to its subject-matter and methods of investigation, mathematical and physical geography, necessity of teaching geography according to the most exact scientific and didactic methods.

AT the last meeting of the Geographical Society of Paris, a letter was read from Major Serpa Pinto, dated Zanzibar, December 10, describing his recent explorations in Eastern Equatorial Africa. He started from Mozambique, and followed the coast, carefully examining the country as he proceeded, until he reached Ibo. Here he organised a large expedition with 200 guards and 700 bearers, carrying provisions and wares, and started for Lake Nyassa, which he reached without difficulty. On the journey he undertook a triangulation survey with levelling. Major Pinto was forced to return to the coast by himself from Nyassa, on account of ill-health; but M. Cardozo, his second in command, continued the journey, and at the time of writing should have been between Nyassa and Bangweolo. Capt. Monteil, of the French Marines, read a paper on the French establishments in Senegal.

A LENGTHY report from M. Thouar to the President of the Argentine Republic, on the Pilcomayo River, has been published. The object of his last exploration was to seek the branch of the river which was most navigable. Leaving Fort Fotheringham on October 25, he reached, on November 12, the rapids, the point which, from the other side, he reached with the Bolivian Expedition in 1883. His conclusion is that it is possible to go at any season of the year from the mouth at Lamboré to the mission of San Francisco de Solano in Bolivia, at the very foot of the Andes, at a short distance from the principal commercial centres of Southern Bolivia. The difficulties caused by accumulations of trees, and the consequent formation of shallows can, in his judgment, be overcome. The report then goes on to describe the incidents of the journey, and the hostility of the Toba Indians, which more than once threatened the existence of the Expedition. M. Thouar left in the beginning of February for Bolivia, crossing the Chaco between the 18th and 19th parallels, still intent on his exploration of the Pilcomayo from the Bolivian side.

THE current *Zeitschrift* (Bd. xxi. Heft 1) of the Berlin Geographical Society has for its first contribution a paper of great interest on the discovery and conquest of Chili, the portion published in the present number dealing with the period between the discovery of the Straits of Magellan and the death of Pedro de Valdivia (1520-54). The writer, Herr Polakowsky, tells the story of the stirring events of which Chili was the theatre at this time with much fire and vigour. The second paper is also devoted to South America. It is an account (accompanied by a map) by Capt. Rohde, of the expedition of Gen. Victorica to the Grand Chaco. The writer first gives some general information about the Chaco, its size, natural divisions, productions, flora and fauna, so far as they are known; then he refers to earlier expeditions, and this brings him to the plan of the campaign under review, and to the events attending the march of the column specially under the command of General Victorica, and of the other columns acting in conjunction with it. As part of this comes the work on the Pilcomayo and Bernejo of Lieut. Feilberg, of which much has already been heard in Europe. In conclusion a list is given of the trees of the Chaco, their native and botanical names, with a few words of description in each case. A shorter paper (the last in the number) is a report on the same expedition by the head of the Topographical Department of the Argentine army. From a geographical and geological point of view this is the most valuable part of the accounts of the campaign. It describes the geology, climate, zoology, mineralogy, &c., of the Chaco.

THE *Verhandlungen* (Band xiii., No. 2) of the same Society contains a paper, by Dr. Zintgraff, entitled "Impressions of the Lower Congo." The writer was a volunteer with Dr. Chavanne, who was despatched to map the lower part of the river, and does not appear to be able to add much that is new to our knowledge of this region. Dr. Ehrenreich writes on the land and people in the Rio Doce in Brazil. This is a paper of much interest, as it sketches the life and habits of a comparatively little-known people, from long and careful observation. Herr Paul Reichard has a long report on his journeys in Eastern Africa and the regions around the source of the Congo. These journeys, of which much has been heard from time to time, extended over about five years, and the present is a popular account of some of their leading features.

THE *Mittheilungen* of the Vienna Geographical Society (Band xxix., No. 2) contains an account by Dr. Breitenhohner, the Director of the Meteorological Station at Sonnblick, near Salzburg, which is the loftiest in the world, being more than twice as high as the Ben Nevis Station. Herr Steinhauser continues and concludes his review of the mathematical geography of the last five years, which takes the form of a series of notes on various books. Dr. Diener continues his contribution to the geography of Central Syria, while further letters from the Congo, from Dr. Lenz, are published.

UNIVERSAL OR WORLD TIME¹

CONSIDERING the natural conservatism of mankind in the matter of time-reckoning it may seem rather a bold thing to propose such a radical change as is involved in the title of my discourse. But in the course of the hour allotted to me this evening, I hope to bring forward some arguments which may serve to show that the proposal is not by any means so revolutionary as might be imagined at the first blush.

A great change in the habits of the civilised world has taken place since the old days when the most rapid means of conveyance from place to place was the stage-coach, and minutes were of little importance. Each town or village then naturally kept its own time, which was regulated by the position of the sun in the sky. Sufficient accuracy for the ordinary purposes of village life could be obtained by means of the rather rude sun-dials which are still to be seen on country churches, and which served to keep the village clock in tolerable agreement with the sun. So long as the members of a community can be considered as stationary, the sun would naturally regulate, though in a rather imperfect way, the hours of labour and of sleep and the times for meals, which constitute the most important epochs in village life. But the sun does not really hold a very despotic sway over ordinary life, and his own movements are characterised by sundry irregularities to which a well-ordered clock refuses to conform.

Without entering into detailed explanation of the so-called "Equation of Time," it will be sufficient here to state that, through the varying velocity of the earth in her orbit, and the inclination of that orbit to the ecliptic, the time of apparent noon as indicated by the sun is at certain times of the year fast and at other times slow, as compared with 12 o'clock or noon by the clock. [The clock is supposed to be an ideally perfect clock going uniformly throughout the year, the uniformity of its rate being tested by reference to the fixed stars.] In other words, the solar day, or the interval from one noon to the next by the sun, is at certain seasons of the year shorter than the average, and at others longer, and thus it comes about that by the accumulation of this error of going, the sun is at the beginning of November more than 16 minutes fast, and by the middle of February 14½ minutes slow, having lost 31 minutes, or more than half-an-hour, in the interval. In passing it may be mentioned as a result of this that the afternoons in November are about half-an-hour shorter than the mornings, whilst in February the mornings are half-an-hour shorter than the afternoons. In view of the importance attached by some astronomers to the use of exact local time in civil life, it would be interesting to know how many villagers have remarked this circumstance.

It is essential to bear these facts in mind when we have to consider the extent to which local time regulates the affairs of life, and the degree of sensitiveness of a community to a deviation of half-an-hour or more in the standard reckoning of time. My own

¹ Lecture by W. H. M. Christie, F.R.S., Astronomer-Royal, at the Royal Institution, March 19, 1886.